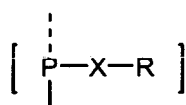


E1
1. (Four-Times Amended) A microchip device comprising a plurality of microlocations, wherein the microlocations each comprise an underlying working microelectrode on a substrate, wherein biomolecules may be transported to the microlocations by the application of an electronic potential to the microelectrode, and wherein at least some of the microelectrodes are covered by a permeation layer comprising at least a first chemical group for attaching biomolecules to the microarray, the first group having the formula:



wherein,

P is a polymerizable moiety covalently attached to one or two moieties selected from the group consisting of a monomeric unit of the permeation layer and another P-X-R group, as defined herein, wherein the other P-X-R group may be the same as or different from the first P-X-R group, further wherein the dashed line is a covalent bond to the second moiety if P is covalently attached to two moieties;

X is a covalent bond or a linking moiety; and

R is a functional moiety for attaching, either covalently or non-covalently, a derivatized biomolecule, or for attaching covalently another P-X-R group, as defined herein, wherein the other P-X-R group may be the same as or different from the first P-X-R group, and wherein R may, optionally, be attached to a biomolecule or another P-X-R group.

E2
2. (Twice Amended) The microarray of claim 1 wherein **P** is selected from the group consisting of alkenyl, α,β -unsaturated carbonyl, vinyl, allyl, and homoallyl moieties.

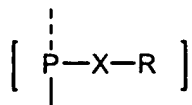
E3
4. (Twice Amended) The microarray of claim 1 wherein **R** is a moiety that requires an activating step prior to participating in a chemical reaction for binding either a derivatized biomolecule or a moiety of another P-X-R group.

E4
6. (Twice Amended) The microarray of claim 5 wherein the basic or acidic condition necessary to activate **R** may be produced by applying an electronic potential at at least one electrode of the microarray.

E5
10. (Twice Amended) The microarray of claim 1 wherein **R** is covalently attached to another P-X-R group, further wherein the **R** is covalently attached to the **P** moiety of the other P-X-R group.

E6
13. (Twice Amended) The microarray of claim 1 wherein **X** is selected from the group consisting of a covalent bond, an alkyl group of 1-10 carbon atoms, an alkenyl group of 2-10 carbon atoms, alkyl esters, ketones, amides, ethers, thioesters, amido groups, carbonyls, and any combinations thereof.

E7
14. (Four-Times Amended) A microchip device comprising a plurality of microlocations, wherein the microlocations each comprise an underlying working microelectrode on a substrate, wherein biomolecules may be transported to the microlocations by the application of an electronic potential to the microelectrode, wherein at least some of the microelectrodes are covered by a permeation layer comprising first and second chemical groups having the formula



wherein,

the dashed line is a covalent bond to a second moiety if **P** is covalently attached to two moieties

P is a polymerizable moiety,

X is a linking moiety selected from the group consisting of a covalent bond, an alkyl group of 1-10 carbon atoms, an alkenyl group of 2-10 carbon atoms, alkyl esters, ketones, ethers amides, thioesters, amido groups, carbonyls, and any combinations thereof; and

R is a functional moiety for attaching, either covalently or non-covalently, a derivatized biomolecule;

wherein the first and second P-X-R groups may be the same or different;

wherein the **P** moieties of the first P-X-R groups are covalently attached to the permeation layer matrix and to one **P** of the second P-X-R groups; and

wherein the **P** moieties of the second P-X-R groups are covalently attached to one or two other **P** moieties of other second P-X-R groups to form a polymer of the second P-X-R groups.

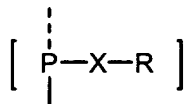
E7
Cond

19. (Twice Amended) The microarray of claim 18 wherein the basic or acidic conditions required for activation may be produced by applying an electronic potential at at least one electrode of the microarray.

E8

21. (Four-Times Amended) A microchip device comprising a plurality of microlocations, wherein the microlocations each comprise an underlying working microelectrode on a substrate, wherein biomolecules may be transported to the microlocations by the application of an electronic potential to the microelectrode, wherein at least some of the microelectrodes are covered by a permeation layer comprising first P-X-R groups and second P-X-R groups having the formula:

E9



wherein,

the dashed line is a covalent bond to a second moiety if P is covalently attached to two moieties;

P is a polymerizable moiety,

X is a linking moiety selected from the group consisting of a covalent bond, an alkyl group of 1-10 carbon atoms, an alkenyl group of 2-10 carbon atoms, alkyl esters, ketones, ethers amides, thioesters, amido groups, carbonyls, and any combinations thereof; and

R is a functional moiety for attaching, either covalently or non-covalently, a derivatized biomolecule;

wherein the first and second P-X-R groups may be the same or different;

wherein the **P** moieties of the first P-X-R groups are covalently attached to the permeation layer matrix

wherein the **R** of the first P-X-R group is covalently attached to at least one **P** of the second P-X-R groups; and

wherein the **P** moieties of the second P-X-R groups are covalently attached to one or two other **P** moieties of other second P-X-R groups to form a polymer of the second P-X-R groups.

E9
Cond

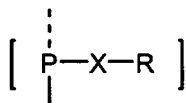
24. (Twice Amended) The microarray of claim 21 wherein the **P** or **R** of the first and/or second P-X-R groups require activation prior to forming a covalent bond between the **P** and **R** of the first and second group, wherein the activation is either under the same or mutually exclusive conditions.

E10

28. (Four-Times Amended) A microchip device comprising a plurality of microlocations, wherein the microlocations each comprise an underlying working microelectrode on a substrate, wherein biomolecules may be transported to the microlocations by the application of an electronic potential to the microelectrode, wherein at least some of the microelectrodes are covered by a permeation layer comprising first P-X-R groups attached to one or two moieties selected from the group consisting of biomolecules and polymerized monomer units comprising second P-X-R groups, wherein the polymerized second P-X-R groups are further attached to biomolecules, wherein the attachment of the biomolecules to the first P-X-R groups or to the polymerized second P-X-R groups requires activation of at least one of the first and/or the

E11

second P-X-R groups under acidic and/or basic pH conditions, wherein the first and second P-X-R groups have the formula



wherein,

the dashed line is a covalent bond to a second moiety if P is covalently attached to two moieties;

P is a polymerizable moiety, wherein;

X is a linking moiety selected from the group consisting of a covalent bond, an alkyl group of 1-10 carbon atoms, an alkenyl group of 2-10 carbon atoms, alkyl esters, ketones, ethers amides, thioesters, amido groups, carbonyls, and any combinations thereof; and

R is a functional moiety for attaching, either covalently or non-covalently, a derivatized biomolecule or for attaching covalently an other P-X-R group;

wherein P comprises a chemical element requiring activation for attaching to the permeation layer and/or to a P of an other P-X-R group; and

wherein R comprises chemical elements requiring activation different from P of either the first or second P-X-R groups for attaching to biomolecules, or to P of another P-X-R groups.

E11
E12
31. (Twice Amended) The microarray of claim 28 wherein P for the first and second P-X-R groups are, independently, selected from the group consisting of alkenyl moieties, α,β -unsaturated carbonyls, vinyl, allyl and homoallyl groups, acetal, thioester, disulfide, epoxides, alkyl ether, and carboxylic acid moieties.

E13
33. (Twice Amended) The microarray of claim 28 wherein the R for the first and second P-X-R groups are, independently, selected from the group consisting of alkenyl moieties,

E13
α,β-unsaturated carbonyls, vinyl, allyl, homoallyl, acetal, ester, carboxylic acid, thioester, disulfide, epoxide, and alkyl ether moieties.

E14
35. (Twice Amended) The microarray of claim **28** wherein the acidic or basic conditions are produced by a method selected from the group consisting of contacting the electronic microarray with a buffer of the appropriate pH, applying an electronic potential at at least one electrode of the electronically addressable microarray to alter the pH, and a combination of the two methods.

E15
72. (Amended) The microarray of claim **14** wherein **P** is selected from the group consisting of alkenyl, α,β-unsaturated carbonyl, vinyl, allyl, and homoallyl moieties.

E16
81. (Amended) The microarray of claim **21** wherein **P** is selected from the group consisting of alkenyl, α,β-unsaturated carbonyl, vinyl, allyl, and homoallyl moieties.
